

HOW WILL A SATELLITE REPEATER SYSTEM IMPACT RADIO COMMUNICATIONS IN A LARGE URBAN AGENCY BY 2009?

By

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Abstract

This project examines the impact on radio communications of changing the radio infrastructure of a large urban agency by moving to a satellite repeater system. Radio communications technology has become a vital part of law enforcement and is key to good responses by agencies responding to incidents from routine calls to major catastrophes. Staying up with technological advances will continue to improve responses for all of public safety. This project includes a history of public safety's radio systems from its origin in 1928, a futures study which identified eight trends and events that might have an impact on a large urban agency's use of a satellite repeater system, a cross impact analysis of the events on the trends, three possible futures scenarios, a strategic and transition management plan, and implications for the future. Funding for an endeavor of this magnitude was identified in the trends, events and cross impact analysis as a significant concern. The strategic plan focused on the established Joint Powers Authority for the region and its ability to coordinate and pull together funding and resources. The transition management plan outlines strategies that brings together the critical mass and identifies who has what authority for decisions. This project contains tables for trends, events, and a cross impact analysis. It also contains commitment and responsibility charts, endnotes and a bibliography.

THE IMPACT OF A SATELLITE REPEATER SYSTEM ON
RADIO COMMUNICATIONS.

Article

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“The United States was saddened today, December 7, 2009, as another space shuttle was destroyed while attempting to place the nation’s first law enforcement communication satellite system (CSS) into orbit. CSS was funded through significant funding supplied by the Office of Homeland Security through grants to the Sacramento Police Department. In compliance with new federal laws, and as a cost-saving measure for the police department, the shuttle crew was performing a retrieval of an older satellite after it had placed the new CSS-3000. This new satellite would have provided the Sacramento public safety community with its fastest and most efficient repeater system to date. The shuttle and new satellite were both destroyed as an undetected meteor shower literally cut the shuttle into three pieces and ripped apart the new satellite. This tragedy, the first for the new Branson Shuttle Service (BSS), put a death nail into the funding that was headed to the establishment of a truly reliable space-based radio system for law enforcement.

Sacramento law enforcement officials had tied their hopes to the CSS as new federal legislation prohibiting the installation of land-based repeater towers has created an urgency for the entire public safety community to find viable alternatives to current land-based systems. This disaster, coupled with the federal government taking funding from the state, and the state taking funding from the local governments, has left few options for the area’s public safety agencies to upgrade their communication technology.

This satellite repeater system was funded via the last of the federal Homeland Security Communication Grants. With President Hillary Clinton

Federal mandates, such as Project 25 Interoperability Standards, are a good start to ensure that there are compatibility requirements for agencies purchasing communication equipment. According to an NIJ study, 70 percent of the over 1300 agencies with over 100 sworn polled stated that consideration of interoperability issues and standards was important to their agency when planning for the purchase of their next land-based mobile radio system. The study also determined the two largest obstacles to interoperability were “limitations in funding” and “different bands” or frequencies that agencies use.³ Most of these agencies often turn to low tech methods to overcome interoperability needs, including posting representatives in dispatch centers to relay information or issuing mobile radios to other agencies. The problem, however, with this and most other mandates is that they are usually unfunded. As a result, not all agencies are able to fully comply with the requirements.

Another issue that impedes the upgrading of radio communications is the issue of repeater towers becoming more difficult to place. This difficulty is centered in two areas: communities not wanting the perceived eyesores and the ability to acquire land to erect a repeater tower or space to mount an agency’s repeater antennae.⁴ This space issue is especially problematic for urban areas with numerous obstructions to radio and cell signals, such as large high-rise buildings. Radio and cell signals operate on a line of sight (LOS) principle and must have repeaters placed so that their signals can be sent and received from various locations in and around these obstructions. It is from this paradigm of using land-based repeaters that law enforcement as a profession or industry can make the leap to have a more compatible system overall.⁵

having done away with the entire Homeland Security Department and moving their funding to her new Office of Nationalized Health Care, law enforcement is looking for new funding or another alternative.”

So, is this futures scenario so far-fetched that it is out of the realm of possibility? Public safety across the United States has had a common interest in having good reliable communication technology. In fact, since the 1920s, law enforcement has been trying to perfect its radio communications in order to provide quick, safe, reliable service to the communities they serve.¹ Law enforcement agencies, however, have been primarily doing it as sole entities rather than as a profession or industry. These solo efforts have resulted in neighboring agencies having good communication devices, yet the inability to communicate with each other.

The fallout from these communication deficiencies has been center stage during some significant major catastrophes and tragedies, such as the Oakland Hills fire and the Columbine High School shooting. They have also resulted in the unnecessary deaths of emergency personnel and members of the communities they serve.²

As a stopgap measure, some agencies are turning to, and paying for, short-term software and hardware solutions to bridge the gap between their individual communication devices. These “translators” are a good initial measure but are using scarce dollars to fix old outdated technology. In addition, if an agency decides to update its communication technology, and follows the well-worn path of going it alone, it will again have to spend unnecessary dollars on a solution to bridging the newest communications gap.

The idea is to pool funding that is being doled out to individual agencies from the federal government in homeland security dollars in order to plan, design and fund a satellite-based communication system for the state. Once the funding is secured, impose this funded mandate upon local jurisdictions to move to this system within a set time frame. Using a satellite-based infrastructure to provide the main repeater system for coverage over the entire state would expedite the process of setting up a system with the necessary individual coverage. As the satellite system would not interfere with the established repeater system, transitioning to the new system would not entail shutting down the existing system until individual tweaking of each agencies new communication system was completed. In addition, land acquisition needs, planning issues, and “not in my back yard” (NIMBY) concerns would not be on the scale of a land-based system. This does not even cover other current issues that may be resolved from undertaking a statewide approach to communications, such as cell phone routing or the need for regional dispatch centers. This approach would provide a much-needed statewide system with coverage and interoperability for all jurisdictions within the state.

Timing is key to moving on a plan such as this. The state is rapidly approaching an urgent need to upgrade their communications technology for its different branches of law enforcement. Its largest police agency, the California Highway Patrol (CHP) is currently operating under an older radio system that operates on the lower bandwidths. CHP’s operations span the state and yet CHP often cannot communicate directly with agencies it overlaps jurisdiction with. (CHP did recently invest in translator technology to bridge their current technology with other agencies so that they can communicate with most agencies via their vehicle’s radio in an emergency.)

Upgrading CHP's communication technology to span the state would be a significant undertaking in the form of needs, cost and issues. Without a statewide approach and local interoperability mandates, the state would probably have to spend additional funds to again bridge CHP's new system to make it somewhat interoperable with local jurisdictions. Having a model to follow where agencies work cooperatively would provide a blue print from which to operate.

A little over a decade ago in the Sacramento region, all of the local agencies were using different technologies and repeater systems. The city police department was using a Motorola system and the county sheriff was using a General Electric system. The smaller jurisdictions were also using different proprietary systems. Upon overcoming agency differences, the region formed a Joint Powers Authority (JPA) and planned, funded and implemented the current regional radio system that enables immediate interoperability between all JPA agencies.

This ability is used on a regular, sometimes daily, basis as there are overlapping jurisdictions. JPA agencies and several smaller agencies in the region can instantaneously switch their communication capabilities in their vehicle, portable or entire dispatching operations at any time for any reason to another agency's radio talk-groups. This flexibility has been tested in the region's responses to large events such as disasters, demonstrations, and highly publicized serial killer manhunts. It is also tested regularly for smaller events such as pursuits, cross jurisdiction warrant services, and requests for additional officers on a citizen's call for service.

The two largest agencies have also assumed regional dispatching due to incidents where, on different occasions, each agencies dispatch centers were shut

down for technical reasons. Having the ability to speak directly or actively monitor the communications of another agency in the region allows for a better, more timely, and more informed response.

As major terrorist instances abroad are increasing in size and frequency and the number of threats in this country requiring public safety responses increase, the ability to communicate and respond across jurisdictional lines rapidly is becoming a higher priority. Having a coordinated response to a terrorist act could not only save lives but could also be a deterrent to future ones. As such, the following is the vision and scenario that is the desired future of communications technology for law enforcement.

“Law enforcement agencies from around the county are hailing public safety’s newest weapon today, December 7, 2009, in the fight against terrorism, their space-based communication technology. The Sacramento Police Department, that spearheaded the push to put satellites in space, is being heralded as a true forward-thinking department. Sacramento’s satellite repeater system was put to the test when it was connected statewide to assist in a terrorist hunt and eventual capture of suspects who had almost set off a dirty bomb in Los Angeles (L.A.). The suspects who had knocked out several repeater and cell towers in the L.A. area were moving quickly when part of their plot was uncovered by the Sacramento area Joint Terrorism Task Force (JTTF). The JTTF immediately connected with officials in L.A. and restored emergency communication in the L.A. area. Sacramento’s satellite was outfitted with the latest technologies, the fastest and largest multi-megabit bandwidth and software solutions that allow

interface with other radio systems. In addition, with the twin satellites 22,000 miles in space, the JTTF was able to immediately converse directly with L.A. patrol units on the ground to foil the terrorist plot before it unfolded.

Sacramento's twin satellites were launched and placed in orbits almost a year earlier by the new Branson Shuttle Service. The satellite repeaters were funded via homeland security grants in addition to local funds the police department was able to secure as part of its Joint Powers Authority (JPA) in the region. Significant funding increases were added to the satellite project in part due to the passage of legislation that prohibited the state from raiding local revenue. Local community groups and environmentalists hailed the project as the cutting edge of a national wave of both private and public agencies taking down their repeater towers. With the passage of NIMBY repeater tower legislation, most public safety organizations have turned to where the Sacramento Police Department has already gone. The President of the United States, Condoleezza Rice, personally praised the men and women who stopped the terrorist plot and the chief of the Sacramento Police Department for their risk-taking in making this satellite system a reality."

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